

REMARKS

Claims 1-7 are pending in this application. Support for new claim 7 is found, for example, at page 3 of the present specification.

Issues under 35 U.S.C. § 103(a) and 102(b)

Claims 1-4 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over the "admitted prior art" in combination Narui (Journal of Crystal Growth, 167 (1996), pp. 452-457). This rejection is traversed for the following reasons. Claims 1-6 have additionally been rejected under 35 U.S.C. § 102(b) as being anticipated by Narui.

Present Invention and Its Advantages

The present invention is directed to a method for forming a GaAs/AlGaAs multiplayer semiconductor structure in which a second layer of higher Al content is grown on a first layer (of lower Al content) at a slower growth rate than that used to grow the first layer. By employing this method, the present invention advantageously reduces the occurrence of defects including: (i) defects which occur over the surface of the substrate when the AlGaAs layer is grown on the flat surface of the GaAs substrate; (ii) random projection defects which project at only about 10 nm

which occur over the surface of the substrate (and generally have a football-like shape); and (iii) defects with regard to forming the interface of the layers parallel to the (100) surface. Advantageous properties exhibited by the method of the present invention are evidenced by the comparative test results discussed at pages 11-12 of the specification with reference to Figures 1 and 2. The method of the present invention advantageously reduces abnormal growth characteristics so as to reduce defects, in contrast to conventional methods.

Distinctions between Present Invention and Cited References

The "admitted prior art" apparently refers to the discussion regarding the "background art" at pages 1-2 of the present specification. This description of convention methods which suffer from abnormal growth defects fails to disclose or suggest a fabrication step in which a second layer of higher Al content is grown on a first layer of lower Al content at a slower growth rate than that used to grow the first layer, as in the present invention.

Narui is directed to inhibiting the occurrence of defects or surface roughness and addresses defects which occur when an AlGaAs layer is grown on stripe-like ridges formed on a GaAs substrate, wherein the ridges are narrow, limited regions. As shown by the

photograph of a sectional view, the defects constitute lines of irregular shape that project nearly one micron. As explained in Narui, the existence of a facet other than the (100) surface (i.e. (2) the surface of the substrate) is essential. Narui indicates that the roughness of the surface (i.e. the occurrence of defects) becomes increasingly serious as the Al content of the AlGaAs layer becomes greater, or as the growth rate thereof becomes higher. Accordingly, Narui suggests to inhibit the occurrence of defects the growth rate must be made lower for the growth of a AlGaAs layer having a higher Al content. Specifically, the growth rate is set to less than 0.6 nm/second (about 10 nm/minute). Consequently, this absolute value of the growth rate of the AlGaAs layer is stipulated.

Narui fails to disclose or suggest any difference in the growth rate of the AlGaAs layers of higher and lower Al content as in the method of the present invention. Narui fails to mention anything regarding the relationship of the growth rates of these two layers having different Al contents. Because Narui and the Admitted Prior Art fail to disclose all of the elements recited in the present claims, prima facie obviousness has not been established. In re Fine, 5 USPQ2d 1596 (Fed. Cir. 1988); MPEP § 2143.03, page 2100-128. Consequently, it is submitted that

significant patentable distinctions exist over the cited references such that the above-noted rejection should be withdrawn.

In view of the above, it is submitted that all of the presently pending claims define patentable subject matter such that the present application should now be placed into condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a three (3) month extension of time for filing a reply in connection with the present application, and the required fee of \$930.00 is attached hereto.

Appl. No. 10/046,741

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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By



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